Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Connect America Fund	)	WC Docket No. 10-90
	)	
High-Cost Universal Service Support	)	WC Docket No. 05-337

COMMENTS OF THE UNITED STATES TELECOM ASSOCIATION, AT&T, CENTURYLINK, FAIRPOINT COMMUNICATIONS, FRONTIER COMMUNICATIONS, VERIZON, AND WINDSTREAM COMMUNICATIONS

Jonathan Banks
Robert H. Mayer
UNITED STATES TELECOM ASSOCIATION
607 14th Street, N.W.
Suite 400
Washington, DC 20005
(202) 326-7300

Donald K. Stockdale, Jr.
Scott M. Noveck
MAYER BROWN LLP
1999 K Street, N.W.
Washington, DC 20005
(202) 263-3000

Gary L. Phillips
Cathy Carpino
AT&T SERVICES, INC.
1120 20th Street, N.W.
Washington, DC 20036
(202) 457-3046

Jeffrey S. Lanning
CENTURYLINK
1099 New York Ave, N.W.
Suite 250
Washington, DC 20001
(202) 429-3113

Michael T. Skrivan
FAIRPOINT COMMUNICATIONS
1 Davis Farm Road
Portland, ME 04103
(207) 535-4150

Mike Saperstein
FRONTIER COMMUNICATIONS
2300 N Street, N.W.
Suite 710
Washington, DC 20037
(202) 223-6807

Maggie McCready
VERIZON
1300 I Street, N.W.
Suite 400
Washington, D.C. 20005
(202) 515-2543

Jennie B. Chandra
Malena Barzilai
WINDSTREAM COMMUNICATIONS, INC.
1101 17th Street, N.W.
Suite 802
Washington, DC 20036
(202) 223-7664

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Pursuant to the Public Notice released by the Wireline Competition Bureau on June 8, 2012,[1] the United States Telecom Association, AT&T, CenturyLink, Fairpoint Communications, Frontier Communications Corp., Verizon, and Windstream Communications (collectively the ABC Coalition) respectfully submit these comments on the model design and data inputs for Phase II of the Connect America Fund.

I. INTRODUCTION AND SUMMARY

Consistent with the principles set forth in the *USF/ICC Transformation Order*[2] and the Public Notice,[3] the ABC Coalition recommends that the Bureau model a green-field fiber-to-the-DSLAM (FTTD) architecture.[4] The model should measure terminal value at the end of the five-year support period as initial investment minus economic depreciation as estimated by the CQBAT model. The model should estimate the total costs of building to the entire study area, and it should allocate common costs according to the cost-causation principles utilized in the CQBAT model. The ABC Coalition also proposes a process for developing an updated data set of national broadband coverage for use in the model.

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1 *Wireline Competition Bureau Seeks Comment on Model Design and Data Inputs for Phase II of the Connect America Fund*, DA 12-911 (released June 8, 2012) ("Public Notice"), *reprinted at* 77 Fed. Reg. 38804 (June 29, 2012).

2 *Connect America Fund*, WC Docket No. 10-90, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd. 17663 (2011) (*USF/ICC Transformation Order*).

3 *See* Public Notice at 4, para. 11.

4 Consistent with the terminology used in the CQBAT documentation, we use the phrase "fiber-to-the-DSLAM" to refer to an architecture where the DSLAM is placed to support a maximum allowed copper loop length of 12,000 feet. This is consistent with what the Bureau terms "fiber-to-the-node" (FTTN), but the CQBAT documentation uses FTTN to refer instead to a VDSL architecture that has shorter loops and that can provide IP television as well as voice and data, so we use the FTTD terminology to avoid any confusion. *Cf.* Public Notice at 8, n.27.

Basing the model on a FTTD architecture is most consistent with the model-design principles set forth by the Bureau and with the Commission's prior efforts to model forward-looking costs. Due to the economics of the rural areas that are likely to receive support, carriers that accept CAF Phase II support will likely build or maintain FTTD networks in the majority of locations, rather than deploy a new and more capital-intensive technology such as fiber to the premises (FTTP). Carriers are especially unlikely to incur the substantial incremental capital costs required to deploy fiber to the premises when the Commission will only guarantee five years of support.

Since carriers will typically deploy or maintain FTTD networks, the Bureau should model that same FTTD architecture to ensure that the modeled costs most closely align with the actual forward-looking costs of carriers when they decide whether to accept or decline support. A FTTD model would also comply with the Commission's past determination that forward-looking cost models should be based on the least-cost, most-efficient and reasonable technology *currently deployed*, since price-cap carriers currently providing broadband in sparsely populated, rural areas similar to the areas likely to be eligible for support have done so by deploying DSL networks. In addition, a FTTD model would allow Bureau to estimate the number of locations that will be able to receive 6 Mbps/1.5 Mbps speeds by the end of the five-year support period, whereas an FTTP model will not work for this purpose.

The Bureau should model the cost of the FTTD network using a green-field approach. A green-field model is easily administered and ensures that carriers will be able to recover the full forward-looking cost of operating a broadband network. For this reason, the green-field methodology has been successfully used by the Commission and state PUCs for many years. By contrast, a brown-field model would produce insufficient levels of support, because it fails to account for all of the future costs that carriers must recover to remain viable, including operating expense, replacement capital expense, depreciation expense, and a return on capital in existing plant. A brown-field model would also be unworkable in practice because it requires detailed input data that are not currently available, would be extremely costly and time-consuming to collect, and could not feasibly be available in the timeframe necessary for CAF Phase II's implementation.

While the Bureau has proposed either a green-field fiber-to-the-premises model or a brown-field DSL model, there is nothing incongruous or conceptually incorrect about a green-field DSL model. Although the Bureau appears to be concerned that a green-field DSL model would compensate carriers for infrastructure that has already been built, the forward-looking cost of that infrastructure cannot be disregarded as if it simply represents the value of the plant that is in the ground. The costs of existing infrastructure cannot properly be treated as simple sunk costs that can be ignored, because carriers must recover the depreciation expense and return on capital associated with undepreciated telecom plant in order to remain whole, and because the associated operating expense and replacement capital expense involve actual monetary outlays. A green-field DSL model allows for a carrier to recover these costs, whereas a brown-field model would not

Terminal value in this model should be measured as investment cost minus economic depreciation as estimated by the CQBAT model, similar to what the Public Notice refers to as "book value." This is consistent with prior costing efforts used in the current Hybrid Cost Proxy Model (HCPM) for universal service funding and in state proceedings to establish the price of unbundled network elements (UNEs). While in theory the forward-looking costs of an efficient provider should be based on the commercial or economic value of the network at the end of the support period, in practice commercial value is difficult to measure and too uncertain and unpredictable to serve as an accurate measure of terminal value. A zero-terminal-value approach is also undesirable, because neglecting the valuable network assets retained by carriers at the end of the modeling period would result in higher support costs per location and thus fewer locations covered within CAF Phase II's fixed budget. The better, more conservative approach is to measure terminal value as investment cost minus economic depreciation as estimated by the CQBAT model.

Costs of common plant should be allocated according to the cost-causation methodologies employed by the CQBAT model, not by the subtractive approach proposed by the Bureau. The subtractive approach is conceptually flawed and makes sense only under certain assumptions that are unlikely to be met. Moreover, the subtractive approach would difficult to model for a full national model, and would almost surely delay significantly implementation of the CAF Phase II program. Instead, the Bureau should allocate common costs based on cost-causation methods that are consistent with past practices, including those used in the current HCPM and in state UNE proceedings. The ABC Coalition submits that the Bureau should adopt the methodology used in the CQBAT model, which attempts to allocate common costs according to traditional cost-causation principles.

Finally, the Commission should develop an updated data set of national broadband coverage using the national broadband data collected in December 2011 and scheduled for release to the public around August 2012. Cable companies should be presumed to meet the speed, latency, data allowance, and other service-quality and price requirements for CAF Phase II. Once the Commission has specified these requirements, it should allow the States a specified period to review and correct the resulting broadband coverage maps based on their own knowledge or any newer data they may possess. The Commission should then implement a challenge process to allow private entities to offer further updates and corrections to the list of census blocks that are served by an unsubsidized competitor.

II. DISCUSSION

A. Principles And Criteria For The Forward-Looking Cost Model

In the Public Notice, the Bureau indicated that its model-design decisions will be motivated by six key criteria:

> (1) precision (*i.e.*, the granularity of the model at a geographic or other level); (2) accuracy (aligning modeled costs with the forward-looking costs of an efficient provider); (3) simplicity (reducing the computational complexity); (4) accessibility (ease with which the public can evaluate and comment on the model); (5) administrative feasibility (the burden on carriers, the Commission, or other interested parties and the time necessary to implement); and (6) costs of implementation.[5]

The ABC Coalition supports these six principles, but ultimately the program's success will be judged on whether parties undertake the substantial capital investment required to extend broadband to new locations.

The ABC Coalition believes it particularly important, when applying the six criteria, that the Bureau remain conscious of how its modeling decisions may affect the timing of implementation for CAF Phase II and related programs. The *USF/ICC Transformation Order* directs that CAF Phase II should be finalized in 2012 and begin providing support by January 1, 2013.[6] The CAF Phase II model is also essential for identifying "remote areas" as part of the implementation of the Remote Areas Fund, which the Commission likewise expects to begin in

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5 Public Notice at 4, para. 11.

6 *USF/ICC Transformation Order*, 26 FCC Rcd. at 17722, 17737, paras. 148, 192.

2013.[7] While the Order allows for a temporary extension of CAF Phase I incremental support if Phase II is not implemented on time, that incremental support would be capped at $300 million annually.[8] This is far short of the $1.8 billion total allocated to support broadband deployment by price cap carriers under CAF Phase II, and thus could substantially delay the deployment of broadband service to rural areas. In addition, other universal service and intercarrier compensation reforms scheduled to begin in the coming years will eliminate subsidies that carriers have traditionally relied upon to support service in high-cost, rural areas.[9] If CAF Phase II support is not yet available to fill the gap, carriers serving these areas may find it difficult, if not impossible, to continue to provide service. Accordingly, the ABC Coalition respectfully submits that simplicity and administrative feasibility should be among the Bureau's paramount goals to ensure timely implementation and disbursement of CAF Phase II support.

B. The Bureau Should Adopt A Green-field DSL Model

The Public Notice proposes adopting either a green-field FTTP model or a brown-field DSL model, but also seeks comment on the ABC Coalition's proposal to use a green-field DSL model.[10] For the reasons set forth below, the ABC Coalition believes that the green-field DSL model remains the approach that best fulfills the principles set forth by the Bureau and is most consistent with the Commission's prior efforts to model forward-looking costs.

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[7] *Id.* at 17675, 17837, 18093-94, paras. 30, 533 & n. 893, 1229.

[8] *Id.* at 17722, paras. 148-149, 158.

[9] *See, e.g.*, *id.* at 17932-37, paras. 798-805 (capping current intercarrier rates and then transitioning them down to bill and keep); *id.* at 17972, para. 881 (adopting 10 % annual reduction in price-cap incumbent LEC's eligible recovery for price cap carriers that participated in CALLS); *id.* at 17988, para. 908 (capping the ARC); *id.* at 17996, para. 920 (phasing out CAF-ICC support for price-cap carriers over three years, beginning in 2017).

[10] Public Notice at 9-10, para. 29.

1. The Bureau Should Model A Fiber-To-The-DSLAM Architecture

The ABC Coalition believes that a Fiber-to-the-DSLAM (FTTD) architecture is most consistent both with the criteria set out in the Public Notice and with principles established by the Commission.[11] To begin with, the Commission has previously recognized that any estimate of forward-looking costs of an efficient provider must be based on the least-cost technology that is currently being deployed, and price cap carriers currently providing broadband in sparsely populated, rural areas have deployed DSL in the vast majority of cases. That is not surprising, since the incremental capital costs of upgrading existing telecom plant to FTTD are substantially lower than those associated with deploying FTTP. Particularly in light of the fact that CAF Phase II support is only guaranteed for five years, it makes sense that carriers that accept CAF Phase II funds will likely choose to deploy FTTD.[12] The Bureau should therefore employ a FTTD architecture for its forward-looking cost model, as this will best align the model's predictions with carriers' actual forward-looking costs over the five-year term.

a. FTTD is the most reasonable technology currently being deployed by price cap carriers in high-cost, rural areas

In the *Universal Service First Report and Order*, the Commission concluded that, when setting universal service support, forward-looking economic cost determinations should be based on "the least-cost, most-efficient, and reasonable technology for providing the supported services

[11] We note that the FTTD technology employed in the CQBAT model was designed to ensure a minimum 4 Mbps down and 768 Kbps up. Because the Commission increased the minimum required upstream speed to 1 Mbps, *USF/ICC Transformation Order*, 26 FCC Rcd. at 17697, para. 94, this will require certain modifications to the CQBAT model. For example, pair bonding will be required to achieve 1 Mbps upstream speed, though that was not modeled in the ABC Plan model.

[12] There may, of course, be exceptions. In a minority of locations there may be a business case to deploy or maintain FTTP technology, and in some locations providers may explore other alternatives.

that is currently being deployed."[13] The *USF/ICC Transformation Order* modifies the Commission's universal service principles to include support for advanced services over broadband, but it does not alter the Commission's prior determination that forward-looking cost estimates are to be based on the least-cost technology that is currently being deployed.[14]

The current practices of price cap carriers generally call for FTTD when deploying broadband to high-cost, rural areas, like those that will be eligible for CAF Phase II funding. All of our members, in evaluating whether to deploy broadband and which technology to deploy if so, make their determinations on a case-by-case basis. In performing these evaluations, network engineers consider such factors as population density, topographical and geographical characteristics, existing telecom plant (both in the area to be built and surrounding areas), and the projected cost of deploying a particular technology (as well as the cost of future upgrades if necessary to meet anticipated demand). They will also consider likely revenues, including expected High Cost USF support. As a rule of thumb, however, where there is existing plant in sparsely populated, rural areas like the areas that will be eligible for CAF Phase II support, the upfront capital costs of deploying FTTP are generally so great as to render that option more uneconomic than FTTD. Thus, the general rule for price cap carriers is to build FTTD when

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13 *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, Report and Order, 12 FCC Rcd. 8776, 8913, para. 250(1) (1997) (*Universal Service First Report and Order*) (emphasis added); *see also Connect America Fund*, WC Docket No. 10-90, *A National Broadband Plan for Our Future*, GN Docket No. 09-51, *High-Cost Universal Service Support*, WC Docket No. 05-337, Notice of Inquiry and Notice of Proposed Rulemaking, 25 FCC Rcd. 6657, 6660-62, paras. 5, 7 (2010) (*USF Reform NOI/NPRM*).

14 *Cf.* Henry Ergas, *TSLRIC, TELRIC and Other Forms of Forward-Looking Cost Models in Telecommunications: A Curmudgeon's Guide* (available at http://ssrn.com/abstract=1430248) (noting that forward-looking cost models generally embody the "best technology in widespread use," rather than the "best available technology," reflecting the fact that "modeling the 'best available technology' would penalize carriers for not constantly adopting the most recent breakthrough. Such a [best-available-technology] standard seems unreasonable and might well have a range of undesirable consequences.").

deploying broadband to sparsely populated rural areas. This is particularly true in light of the fact that the CAF Phase II support will continue for only five years, and the carriers have no assurance that they will receive any further support after that time. In these areas, the network will not be economically viable on an ongoing basis in the absence of support.

b. Price Cap Carriers accepting CAF Phase II support will generally deploy FTTD networks due to the economics of rural broadband

Consistent with these current deployments, price cap carriers that accept CAF Phase II funds will likely deploy FTTD networks—not FTTP networks—in supported areas.[15] As the staff for the Omnibus Broadband Initiative have recognized, FTTD with 12,000-foot loops is "a cost effective solution for providing broadband services in low-density areas."[16] The OBI staff further recognized that the incremental upfront investment required to deploy FTTP would be significantly higher than the incremental cost of upgrading existing plant to FTTD.[17] Given that CAF Phase II support is only guaranteed for five years, and that carriers may be unable to recover the deployment costs from customer revenues alone (particularly if the price-cap incumbent loses the subsequent reverse auction), FTTP deployment will likely be too risky for carriers to incur that investment now in the majority of cases.

Past pronouncements of both OBI and Commission staff not only recognize that price cap carriers *will* prefer FTTD to FTTP in rural areas, but also that they *should* prefer FTTD. As part of the National Broadband Plan, OBI staff calculated that the present-value cost of deploying

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[15] Again, there may be isolated exceptions. *See* note 12, *supra*.

[16] *OBI Technical Paper No. 1*, at 85.

[17] *Compare OBI Technical Paper No. 1* Exh. 4-AV (initial CAPEX of deploying FTTP to unserved households is $44.4 billion) *with id.* Exh. 4-BG (CAPEX of deploying 15,000-foot FTTD is $11.8 billion).

FTTP immediately in rural, unserved areas is significantly greater than the present-value cost of deploying FTTD now and deferring the upgrade to FTTP until higher capacity is needed to keep up with network demand.[18] Indeed, the Commission implicitly has criticized rate-of-return carriers for building out FTTP where it does not make economic sense to do so.[19] In light of this, it will be difficult for the Bureau to base CAF model support on the same FTTP architecture.

The Public Notice thus correctly recognizes that price cap carriers participating in CAF Phase II will "most likely . . . deploy DSL."[20] And this is true regardless what technology the Bureau chooses to model, since—as the Bureau repeatedly notes—carriers will not be obligated to deploy the modeled technology, but instead may use any technology that meets the speed and service requirements.[21] Given the substantially lower incremental capital expenditures associated with FTTD compared with FTTP, and the risk that CAF support may be discontinued after five years, it makes perfect sense that carriers receiving CAF Phase II support will likely prefer FTTD over FTTP in most cases, which makes FTTD the least-cost, most efficient

[18] *Id.* at 41 & Exh. 3-I.

[19] The National Broadband Map reveals that, unlike price-cap carriers, certain rate-of-return ILECs have extensively deployed FTTP in rural, high-cost areas. In the *USF/ICC Transformation Order*, the Commission seemed implicitly to criticize such deployments by noting that under current USF rules, "some carriers with high loop costs may have up to 100 percent of their marginal loop costs above a certain threshold reimbursed from the federal universal service fund." It suggested that this creates inefficient incentives for carriers. First, carriers have incentives to increase their loop costs and recover the marginal amount entirely from the federal universal service fund. Second, carriers that take measures to cut their costs to operate more efficiently may actually lose support to carriers that increase their costs. *USF/ICC Transformation Order*, 26 FCC Rcd. at 17742, para. 211.

[20] Public Notice at 12, para. 34 & n.39.

[21] *Id.* at 5, para. 13 & n.1; *id.* at 7, para. 19.

forward-looking technology that is currently being deployed.[22]

c. The Bureau should model the same FTTD architecture that carriers will actually deploy

To the extent that price cap carriers receiving CAF support are anticipated to deploy FTTD networks, the forward-looking cost model should be based on that same architecture. Matching the modeled architecture to the network technology that providers actually are going to deploy "would align the modeled costs as closely as possible with the forward-looking costs of the wireline providers who have a statewide option to accept or decline support."[23] Accurate forward-looking cost predictions are important to ensure that the model does not overcompensate ILECs, which would reduce the number of census blocks that can be funded within CAF Phase II's fixed budget, and that it does not undercompensate them, in which case providers will decline the funds and the program ultimately will be unsuccessful at spurring the widespread broadband build-out that the Commission seeks.[24]

d. A FTTD model will also estimate the network's ability to scale up to higher speeds

Finally, unlike a FTTP model, a FTTD model will enable the Bureau to comply with the Commission's instruction not only to "ensure that the model design" funds "4 Mbps/1 Mbps broadband service to all locations," but also to "ensure that the most locations possible receive a

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[22] If the CAF Phase II program were to provide long-term funding, it might make sense to model a FTTP architecture, since over the long run the carriers would be able to recover their incremental capital expenditures. But allowing only five years of assured funding provides carriers with too little time to recover the significantly greater up-front capital expenditures associated with FTTP.

[23] Public Notice at 5, para. 14; *accord id.* at 4, para. 11.

[24] To the extent that price-cap incumbent LECs decline CAF Phase II support, not only could this delay the deployment of broadband, but it also could raise the cost of deploying broadband, since incumbent LECs are likely to face lower costs for deploying broadband compared with a new entrant. *Cf. USF/ICC Transformation Order*, 26 FCC Rcd. at 17730-31, para. 175.

6 Mbps/1.5 Mbps or faster service at the end of the five year term."[25] If the Bureau models a FTTP architecture even though price cap carriers will likely deploy DSL service, the model will not be able to accurately predict which locations will receive only the baseline speed and which will be able to provide higher speeds.[26] In fact, an FTTP model cannot reasonably predict which locations will receive the baseline speed, as it would automatically assign 6 Mbps/1.5 Mbps service to ***100%*** of the locations. A FTTD model, by contrast, can estimate what broadband speed will be delivered to a given location based on the length of the copper loop connected to each node.[27] For this and other reasons, the ABC Coalition submits that the goals of the Commission and the Bureau would best be served by modeling the FTTD network technology that carriers will typically deploy.[28]

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[25] *USF/ICC Transformation Order*, 26 FCC Rcd. at 17735, para. 187; *accord* Public Notice at 2, n. 11 ("[T]he model should direct funds to support 4 Mbps/1 Mbps broadband service to all supported locations . . . and should ensure that the most locations possible receive a 6 Mbps/1.5 Mbps or faster service at the end of the five year term, consistent with the CAF Phase II budget.").

[26] The ABC Coalition is also concerned that, notwithstanding the Bureau's disclaimers that carriers accepting CAF Phase II funds will not be obligated to deploy the modeled technology, a decision by the Bureau to use an FTTP model would lead some observers mistakenly to expect carriers to be able to provide higher speeds than those provided by the DSL networks that most carriers will actually deploy.

[27] *See* Public Notice at 12, para. 34. While the green-field DSL model we propose might not perfectly correspond to the loop lengths found in existing infrastructure, it would produce at least a reasonable approximation of the number of locations in a given study area that will be able to ramp up to higher-speed service.

[28] A FTTD model would also capture the beneficial "halo effect" of CAF Phase II implementation on neighboring census blocks that do not receive direct support. Using the CQBAT model and the June 2010 National Broadband Map data, the halo effect generated by FTTD deployment to CAF Phase II-eligible census blocks would more than double the number the number of locations newly served by 4 Mbps broadband—that is, the halo effect on unsupported census blocks would exceed even the direct effect on funded blocks. Based upon the modeled distances, moreover, the halo effect would be even greater when measuring the number of locations receiving 6 Mbps broadband. Because FTTD enables broadband service for all locations connected to a DSLAM, rather than requiring new plant to be built out to each

2. The Bureau Should Model A Green-field Deployment

The Bureau should model a green-field, rather than brown-field, deployment. This is the approach that the Commission has repeatedly followed in the past in order to estimate the total forward-looking cost of a network, in which all costs should be considered "variable and avoidable."[29] The brown-field approach, by contrast, is both logically flawed and unworkable in practice. It is logically flawed because it fails to consider costs associated with existing infrastructure for which a carrier must recover if it is to remain viable. It is unworkable in practice because it depends on detailed input data that are not presently available and could not feasibly be collected in time for CAF Phase II implementation. A green-field approach is therefore necessary to satisfy the Bureau's model-design criteria.

a. The Commission consistently has adopted the green-field approach because it estimates the total forward-looking cost of a network

When choosing forward-looking cost models, the Commission has repeatedly chosen a green-field, scorched-node model, in part because such an approach estimates the full forward-looking economic cost of constructing and operating a network. In the *Universal Service First Report and Order*, for example, the Commission decided to adopt a green-field, scorched-node approach to estimating the cost of providing voice service to high-cost, rural areas.[30] In choosing this approach, the Commission explained that "the proper measure of cost for determining the

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location individually, the halo effect of FTTD deployment is far greater than that which would be achieved by alternative technologies such as FTTP, which require incremental investment for each additional location.

[29] *See In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996*, CC Docket No. 96-98, First Report and Order, 11 FCC Rcd. 15499, 15845, para. 677 (1996) (*Local Competition First Report and Order*); *Universal Service First Report and Order*, 12 FCC Rcd. at 8913, para. 250(3).

[30] *Universal Service First Report and Order,* 12 FCC Rcd. at 17746, para. 224.

level of universal service support is the forward-looking economic cost of constructing and operating the network facilities and functions used to provide the supported services as defined per section 254(c)(1)."[31] It further explained that, "in the long run, forward-looking economic cost best approximates the costs that would be incurred by an efficient carrier in the market . . . [and] that the use of forward-looking economic costs as the basis for determining support will send the correct signals for entry, investment, and innovation."[32] It should be emphasized that the Commission adopted this approach knowing that the majority of non-rural carriers would be providing the supported services over existing networks, which, at most, would require minor incremental investment to meet the supported service requirements.

This decision was consistent with the Commission's earlier decision in the *Local Competition Proceeding* to adopt a green-field, scorched-node approach for determining the cost of unbundled network elements and interconnection.[33] In adopting this approach, the Commission explained:

> Adopting a pricing methodology based on forward-looking, economic costs best replicates, to the extent possible, the conditions of a competitive market. . . . Because a pricing methodology based on forward-looking costs simulates the conditions in a competitive marketplace, it allows the requesting carrier to produce efficiently and to compete effectively, which should drive retail prices to their competitive levels. We believe that our adoption of a forward-looking cost-based pricing methodology should facilitate competition on a reasonable and efficient basis by all firms in the industry by establishing prices for interconnection and unbundled elements based on costs similar to those incurred by the incumbents.[34]

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[31] *Id.* (footnote omitted).

[32] *Id.* (footnotes omitted).

[33] *Local Competition First Report and Order*, 11 FCC Rcd. at 15844-56, paras. 672-703.

[34] *Id.* at 15846, para. 679.

It is noteworthy that, in adopting this approach, the Commission did not exclude from the forward-looking cost estimates the costs associated with sunk network investments. Rather, it included all the forward-looking costs of "constructing and operating the network facilities and functions used to provide the . . . [relevant] services."[35]

b. The brown-field approach is logically flawed

In contrast to the green-field approach, which has been twice sustained on appeal,[36] the brown-field approach suffers from a fundamental logical flaw: it fails to consider the costs associated with the existing infrastructure. These costs include ongoing operating expenses, including replacement capital and maintenance expense,[37] and the capital costs associated with the undepreciated plant, including both depreciation expense and a return on capital. By focusing only on required incremental investment and ignoring these other costs that would be included in a green-field approach, the brown-field approach inevitably underestimates the total forward-looking economic cost of constructing and operating a network that can provide broadband service at the specified speed.[38] But these excluded costs are real costs, which

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[35] *Universal Service First Report and Order,* 12 FCC Rcd. at 17746, para. 224.

[36] *See Verizon Commc'ns Inc. v. FCC*, 535 U.S. 467, 475, 497-528 (2002) (upholding the Commission's authority to set rates "on a forward-looking basis untied to the incumbents' investment"); *Qwest Corp. v. FCC*, 258 F.3d 1191, 1194, 1205-07 (10th Cir. 2001) ("We review and uphold the FCC's computer model of the costs of providing service in a given area.").

[37] As the Bureau notes, operating and maintenance expenses for DSL networks, which require active electronics in the outside plant, are higher than for other technologies. *See* Public Notice at 10-11, paras. 31, 35, 39.

[38] *Cf.* Ergas, *supra* note 14 ("The choice between [brown-field and green-field] boils down to the treatment of sunk costs. As a matter of theory, forward looking cost models are intended to act 'as if' sunk costs did not exist. As a result, it seems inconsistent with the purpose to assume that some sunk costs (say, those associated with trenching) should be treated as sunk, while others (say, those associated with cabling) are not. Moreover, the line drawn between these would seem to be arbitrary, and would hence reduce the significance of the results. Consequently, it seems best to consistently adopt a greenfield approach." (footnotes omitted)).

regulators and courts have long recognized that carriers should be able to recover. For example, the ongoing operational expense associated with the existing network, including replacement capital and maintenance expense, involves actual monetary outlays that must be recovered if the carrier is to remain in operation. Similarly, unamortized depreciation and return on capital must be recovered if the carrier is to remain whole and to continue to have an incentive to invest.[39] By ignoring these real costs—real because price cap carriers relying on embedded plant to meet CAF Phase II obligations will continue to incur those costs—the brown-field approach will underestimate the forward-looking cost of constructing and operating a broadband wireline network.

It is not a sufficient response to argue that the costs of the existing network can be ignored because the costs are sunk. First, that is clearly not true with respect to ongoing operational expenses. For example, maintenance expense and replacement capital (*e.g.*, to replace plant damaged in a storm or to provide extra copper pairs for pair bonding) requires

[39] We note that neither the brown-field model nor the green-field model account for the costs of that part of the existing network that will be replaced as it is rendered technologically obsolete. Yet historically regulators and academic experts have recognized that, in many cases, it may be appropriate—even necessary—to allow recovery of these stranded costs caused by technological obsolescence. Thus, for example, Charles Phillips explains that "for regulated companies, the unrecovered investment in old equipment may be a relevant factor in making an investment decision" and that, because of this, regulatory commissions generally allow for recovery of stranded investment. CHARLES F. PHILLIPS, JR., THE ECONOMICS OF REGULATION 198-99 (1969); *accord* 1 ALFRED E. KAHN, THE ECONOMICS OF REGULATION: PRINCIPLES AND INSTITUTIONS 119 (1970) (noting that when technological progress renders existing equipment worthless before the assets were fully depreciated, "a regulated company will be deterred from replacing old assets with economically more efficient new ones unless it is permitted to continue to charge customers the capital costs of the unamortized portion of previous investments"). Thus, for example, when FERC introduced competition into the generation of electricity by imposing mandatory wholesale wheeling, this rendered much of the generating equipment and long-term supply contracts of incumbent electric utilities obsolete. The Commission accordingly allowed electric utilities an opportunity to recover their stranded costs. *Order 888, Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Service by Public Utilities and Recovery of Stranded Costs by Public Utilities and Transmitting Utilities,* 61 Fed. Reg. 21540, 21630 (1996) (codified at 18 C.F.R. pts. 35 and 385).

monetary outlays, which could be avoided if one were to shut down the network. Second, it is not even an adequate response with respect to the capital investment that is sunk. Under the principles established in the *Universal Service First Report and Order*, a carrier must be allowed to recover the capital cost of the plant that remains in use, even though it is the forward-looking costs, rather than historical costs, that are recovered. Because it does not do so, the brown-field approach does not "approximate the costs that would be incurred by an efficient carrier in the market."[40] And by underestimating the costs of constructing an efficient broadband network, this approach is likely to deter price-cap carriers from accepting the support and associated obligations.

Finally, we note that the green-field approach takes a very conservative approach to the costs associated with those parts of the existing network that will remain in place and in operation. First, it excludes the stranded costs of those parts of the network that will be replaced, such as copper feeder, even where the equipment is not fully depreciated. Second, while it will take into account the cost of those parts of the network that will remain in operation, it will not allow recovery of all historical or embedded costs, but rather will only allow recovery for the forward-looking cost of "the least-cost, most-efficient, and reasonable technology for providing the supported services that is currently deployed."[41]

c. Costs associated with existing infrastructure cannot be ignored on the assumption that the existing plant is breaking even.

Proponents of the brown-field approach might believe that the costs associated with existing plant can be ignored, because they assume that existing revenues have been sufficient to cover those costs. But that assumption is incorrect in high-cost areas where there is no

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[40] *Universal Service First Report and Order*, 12 FCC Rcd. at 8899, para. 224.

[41] *Id.* at 8913, para. 250(1); *USF Reform NOI/NPRM*, 26 FCC Rcd. at 6660-62, paras. 5, 7.

independent business case absent support. The current infrastructure was built in a regulatory environment that provided significant implicit and explicit subsidies and that sometimes subjected incumbents to carrier-of-last-resort obligations. Existing carriers received *explicit* subsidies through legacy high-cost universal service support programs,[42] but those subsidies are being phased out by the Commission. Carriers also have received *implicit* subsidies from above-cost access charges, but those subsidies too are being phased out through intercarrier compensation reform.[43] In fact, some of the costs associated with the loop and transport functions that previously have been recovered via access charges will no longer be recovered via access charges, since the Commission is moving terminating access to bill and keep.

While the Commission has allowed price cap carriers to make up part of this lost revenue through the ARC, it is not clear whether, given competitive conditions—only 4 out of 10 households purchase voice service from an ILEC[44]—that carriers will be able to raise their fees to the level authorized by ARC cap.[45] Likewise, carriers may, under certain circumstances, make

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[42] *See* National Broadband Plan § 8.2 (listing various subsidy programs); *cf.* Public Notice at 4, para. 7 n.19 (recognizing that census blocks which currently receive broadband access may be eligible for CAF Phase II support because that access was subsidized by "legacy forms of high-cost universal service").

[43] In addition to the implicit subsidies arising from above-cost intercarrier charges, there were other existing implicit subsidies, such as those from urban to rural customers and from business to residential customers. Competition is quickly eroding away these implicit subsidies, however, as competitors naturally target the more profitable areas and customer types that historically have been the source of the subsidy. *See* JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS: AMERICAN TELECOMMUNICATIONS POLICY IN THE INTERNET AGE 52-55 (2005).

[44] Timothy Horan et al., *Communications Services Poised to Outperform*, Oppenheimer & Co., July 6, 2011, at 6 ("Between 2003 and 2010, telcos' voice market share went from 80% to 40%."); Jason Bazinet et al., *Video, Data, & Voice Distribution*, Citi Investment Research & Analysis, May 13, 2011, at 6 & fig.8 ("Telco voice declined to around 47.7 million wireline subs, or 43% of all US households.").

[45] *USF/ICC Transformation Order*, 26 FCC Rcd. at 17971, para. 879.

up some of the lost access revenue from the Connect America Fund, but again the Price-Cap Eligible Recovery may be phased down, reducing this recovery.[46] Without these subsidies, one cannot assume that existing plant will continue to break even (even if it has done so in the past), and thus there is no basis to disregard continuing costs of the existing infrastructure when calculating the forward-looking costs of constructing a broadband network.

Finally, because some price-cap carriers may have been subject to carrier-of-last-resort (COLR) obligations in certain locations, it is possible that, even with the implicit subsidies, they were operating at a loss in the most rural, highest-cost areas. In such instances, the only reason that the carrier built out its network and provided services in those areas was because of the COLR obligations. Moreover, as incumbent LECs continue to lose lines and as average costs per line rise, the COLR requirement may turn marginal business cases into negative ones.

d. The brown-field approach is impractical and would delay implementation of CAF Phase II

In addition to these conceptual problems, a brown-field model would be unworkable in practice because it requires extensive input data that would be expensive to develop, would take years to collect, and would likely contain numerous errors. Even if it proves feasible to collect these data with sufficient accuracy to estimate costs of broadband deployment at the census-block level, it certainly would not be possible to do so in time to implement CAF Phase II by January 1, 2013, or any time close to that target date. Even then, it is by no means clear that these data would be sufficiently accurate or verifiable to yield cost estimates that are any more reliable than the estimates that would be produced by a green-field model.

As the Public Notice recognizes, "the use of a brown-field model makes the availability of some data sets more important . . . because the cost of a brown-field deployment cannot be

[46] *Id.* at 17942-46, paras. 817-829.

reasonably estimated without them."[47] In particular, "[t]he ability of a given loop length to deliver desired speeds depends on age and quality of existing plant, and on the gauge of the copper wires," but "[i]t is unclear if the necessary data for existing copper deployments are available."[48] In addition, the 1 Mbps upstream speed specified by the Commission will require carriers to use pair bonding, so a brown-field model would need data on the amount of spare copper pair per location, but these data likewise may not be available. Consequently, "[a] lack of reliable data sets to address these needs would undermine the development of a brown-field model."[49] And although the Public Notice mentions the possibility of making sweeping generalizations about "average plant mixes" as a substitute for data on actual plant mix, this would render the model far too inaccurate to use, because differences between the nationwide average plant mixes and the actual plant mix in a given area "would have potentially significant impact on the support levels for smaller price cap carriers or for states that have large variances from the average."[50]

The ABC Coalition members do not keep these data, or do not keep them in an easily accessible electronic form. Moreover, much of these data may be inaccurate or outdated. It would be extremely costly and time-consuming to retrieve these data, verify their accuracy, and put them in a form that the Commission could use—especially at a sufficiently granular level to meet the model's requirements. Moreover, as the Bureau observes, "this approach may create

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[47] Public Notice at 12, para. 36.

[48] *Id.* at 12, para. 35.

[49] *Id.* at 12, para. 36.

[50] *Id.* at 28, para. 96. *Cf. OBI Technical Paper No. 1*, at 24-25 (discussing likelihood of errors "in any single, particular, small geography," when using statistical modeling as a substitute for actual disaggregated data concerning existing infrastructure).

administrative burdens on both the carriers and the Commission, and would be subject to approval by OMB."[51] As a result, even if it were feasible to compile these data over time, the data surely would not be available in time for the Commission to meet its deadline of implementing the CAF Phase II program by January 1, 2013, and implementation potentially could be delayed by years.

e. The green-field approach better satisfies the Bureau's modeling criteria

As discussed above, the brown-field approach is not only theoretically flawed, but also raises numerous and significant practical, implementation problems. As a consequence of these data-collection and implementation difficulties, a brown-field model would flunk most of the criteria the Bureau has set forth for its model-design decisions. A brown-field model would be imprecise, since data on current plant are not available at a sufficiently granular level. A brown-field model would also be inaccurate, because there is no reliable means for collecting these data and because actual plant mix in a given study area may diverge sharply from proxies such as the regression results used in the model for the National Broadband Plan.[52] It would likewise run counter to the goal of simplicity, because the model would need to account not only for the location of current plant, but also the age and quality of each component and the gauge of the copper loop. It would not be meaningfully accessible to the public, since there would be no effective way for the public to verify the information supplied by carriers. Nor would it be administratively feasible, given the tremendous burden carriers and the Commission would face in collecting these data and the time it would take to implement such a model. And, as the

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[51] Public Notice at 28, para. 95. In addition, as the Public Notice points out, it would "be difficult . . . to verify the data submitted by the carriers," making a brown-field model would also be less accessible for evaluation by the public. *Id.*

[52] *See OBI Technical Paper No. 1*, at 23.

Bureau has recognized, the costs of implementation would be enormous. These practical reasons alone should be enough to compel the Bureau to reject the brown-field approach to its forward-looking cost model.

In contrast to the myriad practical challenges to estimating an accurate brown-field model, the green-field methodology is tested and proven, having been used by the Commission and by state PUCs for many years. The HCPM model has been successfully used by the Commission for over a decade, and CostQuest models have been adopted in multiple carrier-to-carrier proceedings and negotiations and were used to support the National Broadband Plan. The ABC Coalition members believe that a well-established green-field model, such as the CQBAT model, provides the best means to reliably estimate forward-looking costs in time to implement CAF Phase II on or around the target date of January 1, 2013.

3. A Green-field DSL Model Approximates The Forward-Looking Costs Of An Efficient Provider

In the Public Notice, the Bureau expresses a concern that a green-field FTTD approach "is not likely to represent providers' actual expenditures to provide broadband over the five-year modeling period" because "it would provide support for construction of parts of the existing network that are unlikely to be replaced during the modeling period."[53] The ABC Coalition respectfully submits that this is an incorrect way of looking at the relevant costs.

As we have explained, it is not correct to disregard the costs of existing infrastructure that would be reused as simple sunk costs. If a carrier did not eventually receive sufficient revenue to cover its depreciation expense and capital costs associated with its existing plant, over the long run it would not be able to continue operating as a going concern. The Public Notice does appear to briefly recognize that it would be wrong to "ignore[] sunk costs associated with the

[53] Public Notice at 12, para. 33.

existing plant," because doing so "will not provide sufficient funds to meet universal service goals over the long run."[54] But its criticisms elsewhere of the green-field approach fail to acknowledge that the depreciation cost and return on capital associated with the existing plant, as well as ongoing operating expense (including replacement capital necessary for pair bonding, for example), must be accounted for in a forward-looking cost estimate. Put simply, the green-field model does not provide support for construction of parts of the existing network; rather, it provides a current value for the economic depreciation and return on capital of the existing network.

In other words, the fact that existing plant has already been constructed does not mean that a carrier is no longer entitled to recover depreciation, capital costs, and ongoing operating expenses associated with that plant if the Commission intends for price cap carriers to rely on embedded plan to provision broadband services. These costs associated with existing plant are real costs that a carrier must recover to continue as a viable economic entity, and therefore must be factored into the Bureau's cost projections. A green-field DSL model allows for a carrier to recover these costs, whereas a brown-field model would fail to provide sufficient recovery to cover all costs.[55]

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[54] *Id.* at 12, para. 35.

[55] It is true that a green-field model would compensate a carrier for the cost of building new, undepreciated plant, whereas the existing plant the carrier uses to deploy DSL networks may have been in operation for several years. But it is also true, as was explained above, that a green-field DSL model would fail to compensate the carrier for other existing plant that the FTTD upgrade will render obsolete before natural end of its economic lifetime, such as copper backhaul that will be replaced by fiber optic cable. Leading authorities on public utility regulation explain that regulated utilities should be allowed to recover for sunk costs associated with technologically obsolete plant in order to provide the utility an incentive to quickly adopt new technologies with lower variable cost. *See, e.g.* PHILLIPS, *supra* note 39, at 198-99 (explaining that regulators typically allow for recovery of capital costs associated with plant subject to technological obsolescence); 1 KAHN, *supra* note 39, at 119 (same); *see also* William J. Baumol, Paul L. Joskow & Alfred E. Kahn, *The Challenge for Federal and State Regulators: Transition*

C. Terminal Value Should Be Modeled As Investment Minus Economic Depreciation, As Estimated By The CQBAT Model

The ABC Coalition proposes that the Bureau measure terminal value in a green-field DSL model as investment cost minus economic depreciation, as estimated by the CQBAT model. Our proposed approach resembles the approach that the Public Notice refers to as "book value," though we believe that the CQBAT model estimates the depreciation due to physical deterioration more accurately than typical accounting approaches to depreciation. This approach would be superior in practice to either the commercial-terminal-value approach or the zero-terminal-value approach.

a. Economic depreciation is an appropriate means of measuring terminal value

In the *Local Competition Order*, the Commission concluded that an appropriate depreciation rate should "reflect[] the true changes in economic value of an asset and a cost of capital that appropriately reflects the risks incurred by an investor."[56] Economic depreciation consists of two components—one that reflects the physical deterioration of the equipment and a second that represents the decline in economic value resulting from technological obsolescence

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from Regulation to Efficient Competition in Electric Power (1995) (arguing that electric utilities should be able to recover stranded capital resulting from the introduction of competition into electricity generation). Our point is not that a green-field DSL model will yield a perfect estimate of the precise forward-looking costs a carrier faces in any given census block—it will not—but rather that it provides a reasonably accurate estimate, especially compared with other possible model specifications.

[56] *Local Competition First Report & Order*, 11 FCC Rcd. at 15856, para. 207; *see also* Michael A. Crew & Paul R. Kleindorfer, *Economic Depreciation and the Regulated Firm Under Competition and Technological Change,* 4 J. Reg. Econ. 51, 53 (1992) (defining economic depreciation as the change in the value of an asset during a period t to $t+\Delta$).

or regulatory or market changes.[57] The CQBAT model, which the Public Notice describes as using a book-value terminal value, attempts to estimate economic depreciation.

As described in more detail in Appendix A, CQBAT's Capital Cost Model calculates annual book depreciation expense based on Equal Life Group (ELG) methodologies, using Gompertz-Makeham survivor curves and projected economic lives. The use of ELG methods and Gompertz-Makeham survivor curves in estimating telecommunications plant lives is a widely recognized methodology. The physical mortality process uses observed mortality history to establish a mortality survivor curve that reflects past and anticipated mortality patterns. The mortality survivor curve is constrained, however, so that the economic lives for all network equipment fall within the recommended range set by the FCC.[58] It should be emphasized that these depreciation estimates are extremely conservative in that they use FCC economic lives, which were established in 1999 and which may not adequately account for the increase in technological advancements and increased competition that have occurred since 1999. Moreover, the Commission's economic lives obviously do not take into account the possible effects on the economic value of the equipment should a price-cap carrier lose the reverse auction after five years, with the support going to a competing provider.

The ABC Coalition submits that the depreciation approach used in the CQBAT model is an appropriate, though admittedly conservative, means to approximate the remaining value in the

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[57] *See, e.g.*, PHILLIPS, *supra* note 39, at 195-98 (explaining that depreciation includes both physical deterioration and functional depreciation and noting that functional depreciation, which is "due to changes in technology, demand, or public requirements" may be "of more importance than physical depreciation"); *accord* JAMES C. BONBRIGHT, ALBERT L. DANIELSEN & DAVID R. KAMERSCHEN, PRINCIPLES OF PUBLIC UTILITY RATES 282-83 (2d ed. 1988) ("In regulation, the allowances for depreciation . . . are designed to cover functional depreciation including obsolescence and not merely physical deterioration or wear and tear.").

[58] *See In the Matter of 1998 Biennial Regulatory Review Review of Depreciation Requirements*, CC Docket No. 98-137, Report and Order, 15 FCC Rcd. 242 (1999).

telecom plant at the end of the five-year modeling period. Although it is difficult to predict how changes in technology or regulation may affect the economic value of the existing plant, especially in an industry exhibiting such rapid innovation and significant regulatory change, this approach provides a reasonable method for estimating economic depreciation and hence approximates the economic terminal value, assuming that demand and technology remain the same.

b. Commercial value is too uncertain to be a useable measure of terminal value

While in theory the forward-looking costs of an efficient provider should be based on the commercial or economic value of the network at the end of the support period, modeling that value on a forward-looking basis is likely to prove unworkable in practice.[59] For one thing, the commercial value of the plant at the end of the five-year support period depends not only on the physical life of the plant and physical deterioration. It also depends on possible technological innovations that have yet to be developed that may render the equipment obsolete, but it is impossible to anticipate whether such a technology will be developed and deployed with the next five years. In addition, it depends on how consumer demand evolves over the five year period. But as the Public Notice recognizes, "[i]t may be difficult . . . to forecast revenues and profit, especially if it is unknown whether the carrier will continue to receive support after five years."[60] Moreover, as the Bureau again notes, "the commercial value and remaining life of a brown-field DSL deployment"—which is the technology that most carriers will ***actually*** deploy, regardless of

[59] As noted above, the CQBAT model attempts to estimate economic depreciation based on historical data, but the accuracy of its estimates depend on proper inputs for lives, mortality, and salvage and on whether historical data are a good predictor of future trends.

[60] Public Notice at 10, para. 27.

what architecture the Bureau models—is especially uncertain, because DSL does not "scale[] readily to higher-speed services" should demand rise at a faster pace than anticipated.[61]

In addition, because carriers may lose support at the end of five years—for example, because support shifts to a competitor due to the development of a newer, cheaper, or more efficient technology—carriers could suffer such a loss of revenue that they would not even recover their average variable costs. If this should occur, the carriers, if they are rational and profit-maximizing, would simply shut down operation. The Bureau apparently recognizes this possibility when it notes that "[b]ook value may overstate the terminal value . . . if there is a lack of a business case for continuing to provide service without ongoing support."[62]

For these reasons, we believe that it is too difficult to predict with any meaningful certainty what the theoretical commercial or economic value of the network will be at the end of the five-year support period. As a result, a model that makes speculative predictions of future developments in technology, demand, and regulatory policies to generate estimates of commercial or economic terminal value is likely to be highly inaccurate. Indeed, because the five-year modeling period "is much shorter than the lifetime of many of the assets in the model," the highly speculative economic value projection "would . . . make annual cost and support levels highly dependent on the terminal value," overwhelming the influence of other, more stable and reliable inputs to the model.[63] The ABC Coalition therefore agrees with the Bureau that,

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61 *Id.* at 10, para. 25.

62 *Id.* at 10, para. 26.

63 *Id.* at 11, para. 32.

"[g]iven the degree of uncertainty associated with estimating commercial value," it would be "inappropriate to use commercial value to determine the terminal value."[64]

c. Depreciation as estimated by the CQBAT model is preferable to a zero-terminal-value approach

Although the Bureau has proposed pairing a DSL model with a zero-terminal-value approach,[65] the ABC Coalition submits that the better approach is to measure terminal value as investment value minus economic depreciation as estimated by the CQBAT model. First, economic depreciation as estimated by the CQBAT model is likely to yield more accurate forward-looking cost estimates because it recognizes that carriers retain valuable network assets at the end of the five-year modeling period. Second, compared to a zero-terminal-value approach, an economic-depreciation approach recognizes the ongoing value in network assets at the end of the modeling period. This positive terminal means that forward-looking annualized cost estimates will be lower (compared to a zero terminal value), which in turn implies lower support levels per location. This means that, by using the CQBAT approach to depreciation, the CAF Phase II fund will be able to bring broadband to a greater number of locations for a fixed sum of funding, which will reduce the number of households that will be relegated to the Remote Areas Fund. By contrast, a zero terminal value would increase support costs so that fewer locations would receive broadband under the CAF Phase II fund and more locations would be above the "extremely high-cost" threshold for the Remote Areas Fund. Indeed, under certain reasonable methods for setting the lower cost threshold, a zero terminal value could result in

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64 *Id.*

65 *Id.* at 10-11, 13, paras. 29, 37.

more than one percent of locations falling above the extremely high-cost threshold, thus exceeding the limit set by the Commission.[66]

Thus, using the CQBAT approach will further the Commission's goal of maximizing the number of households that will receive broadband under the CAF Phase II program. Moreover, it is less speculative than the attempt to estimate an economic/commercial terminal value and less pessimistic than using a zero terminal value. The ABC Coalition believes that the CQBAT approach to depreciation (and thus to calculating a terminal value) represents the best way to align modeled costs with the actual forward-looking costs of an efficient provider.

D. Costs Of Common Plant Should Be Allocated According To The Cost-Causation Methodology Employed By The CQBAT Model

The ABC Coalition agrees with the Bureau's proposal to model the costs of the entire study area,[67] but we disagree with the proposal to allocate common costs according to a

[66] When the CQBAT model was run with its default depreciation assumptions and terminal values, an $80 benchmark, and a $1.8 million cap on total CAF Phase II funding, approximately 728,000 locations were above the resulting extremely high-cost threshold of $256 and thus placed in the Remote Areas Fund. This is consistent with the Commission's finding that no more than one percent of locations should be served with alternative technologies supported by the Remote Areas Fund. The CQBAT model was then rerun assuming five-year economic lives (and thus a $0 terminal value), an $80 lower cost benchmark, and a $1.8 million fund cap. This run resulted in 3.1 million locations exceeding the "extremely high-cost" threshold. Finally, CQBAT was run a third time under the assumptions of five-year economic lives, a $1.8 billion cap on CAF Phase II support, and a lower cost threshold equal to the 95th percentile in terms of cost. This run resulted in 1.3 million locations exceeding the extremely high-cost threshold and being forced into the Remote Areas Fund. Thus, if the Commission were to adopt a zero terminal value, under reasonable assumptions for a lower cost threshold, this would multiply the number of locations that would exceed the extremely high-cost threshold and be served by alternative technologies. And under some reasonable assumptions for the lower benchmark, the percentage of locations above the extremely high-cost threshold for the Remote Areas Fund would exceed one percent, thus violating the Commission's directive that no more than one percent of locations should be served with alternative technology.

[67] Public Notice at 13-16, paras. 40-48.

"subtractive approach."[68] The subtractive approach is conceptually flawed and will result insufficient levels of support. Moreover, it is impractical and would likely delay implementation of CAF Phase II. Instead, the ABC Coalition submits that the Bureau should allocate the costs of common plant according to the cost-causation methodology employed by the CQBAT model.

a. Common costs should be allocated and recoverable

Telecom networks exhibit significant geographical economies of scope, also known as geographical complementarities, which are due in large extent to the high proportion of common or shared plant.[69] This means that it will be significantly cheaper to extend a network from Census Block A to Census Block B than it would be to build a separate stand-alone network that serves only Census Block B.[70]

Because of the extensive common costs[71] of a telecom network, it has also been long recognized that setting prices or support on the basis of incremental cost[72] will not result in the

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[68] *Id.* at 16-20, paras. 49-56.

[69] William Sharkey explains that economies of scope exist "if it is possible to produce any vector of outputs more efficiently in a single firm than in two or more specialty firms, holding constant the level of production of each output." WILLIAM SHARKEY, THE THEORY OF NATURAL MONOPOLY 56 (1982). Thus, for example, economies of scope would exist if it is cheaper for a single firm to produce two products rather than for two firms each to produce a single product, or, in this case, if it would be cheaper for a single firm to serve two geographic areas, rather than having two firms each serve a single geographic area.

[70] *Cf.* Public Notice at 19, para. 54.

[71] "Common costs" refer to "costs that are incurred in connection with the production of multiple products or services, and remains unchanged as the relative proportion of those products or services varies." *First Local Competition Order,* 11 FCC Rcd. at 15845, para. 676.

recovery of the total costs of the plant. Thus, in the *Local Competition Order,* the Commission noted that basing the prices of unbundled network elements solely on forward-looking incremental costs "will not recover the total forward-looking costs of operating the wholesale network.[73] Because of this, regulators have adopted various methods to try to allocate common costs in a way that reflects cost causation.[74] The subtractive approach proposed by the Bureau, departs from traditional cost-causation principles and allocates the entirety of common costs in the forward-looking cost model to census blocks that are ineligible for support. That approach is unsound.

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[72] Suppose that a carrier serves areas A and B. The Incremental Cost of serving area A is defined as equal to the Total Cost of serving areas A and B less the Stand-Alone Cost of serving area B. Likewise the Incremental Cost of serving Area B is equal to the Total Cost of serving A and B less the Stand-Alone Cost of A. The Common Cost associated with serving areas A and B is then equal to the Total Cost of serving A and B less the Incremental Cost of A less the Incremental Cost of B. These identities can be expressed in symbols as follows:

$$IC_A = TC_{A+B} - SA_B \quad IC_B = TC_{A+B} - SA_A \quad CC_{A,B} = TC_{A+B} - [IC_A + IC_B]$$

For a more detailed discussion, *see* WILLIAM J. BAUMOL, JOHN C. PANZAR & ROBERT D. WILLIG, CONTESTABLE MARKETS AND THE THEORY OF INDUSTRY STRUCTURE 67 (1982).

[73] *First Local Competition Order*, 11 FCC Rcd. at 15852, para. 694; *see also* DANIEL F. SPULBER, REGULATION AND MARKETS 113-14 ("When *economies of scope* are present, the regulator faces the problem of . . . allocat[ing] nonattributable or joint costs between the firm's output. Prices equal to marginal or incremental costs will not fully allocate total costs.").

[74] *See, e.g.*, *First Local Competition Order*, 11 FCC Rcd. at 15851-54, paras 694-98l; *In the Matter of Telephone Company-Cable Television Cross-Ownership Rules*, CC Docket No. 87-266, Mem. Opinion and Order on Reconsideration and Third Further Notice of Proposed Rulemaking, 10 FCC Rcd. 244, paras. 215-221 (1994) (*Video Dialtone Reconsideration Order*) (discussing how, consistent with cost-causation principles, carriers should allocate direct and common costs between regulated services and nonregulated video dialtone service); *cf. Separation of Costs of Regulated Telephone Service from Costs of Nonregulated Activities*, CC Docket No. 86-111, Report and Order, 2 FCC Rcd. 1298, 1313, 1318, paras. 112, 157 (*Joint Cost Order*) (discussing need to balance cost-causation principles against simplicity in designing cost allocation rules and identifying principles for allocating costs between regulated and nonregulated services), *recon.*, 2 FCC Rcd. 6283 (1987), *further recon.*, 3 FCC Rcd. 6701 (1988), *aff'd sub nom. Southwestern Bell Corp. v. FCC*, 896 F.2d 1378 (D.C. Cir. 1990).

b. The subtractive approach is conceptually flawed

The subtractive approach is conceptually flawed because it would allocate only the incremental portion of common plant to the supported census blocks, notwithstanding the carrier's need to recover average total costs to remain viable in the long run. It would only result in the full recovery of the total cost of the network under certain assumptions, which are unlikely to hold in practice. Specifically, the subtractive approach only makes sense if one assumes not only that the ILEC will provide broadband service to both the eligible and ineligible areas, but also that it will make sufficient revenue from the ineligible portions of the study area to cover the stand-alone cost of providing service to those areas (so that it can extend service to the covered census blocks by incurring only incremental costs).

There is no basis for this assumption. In cases where the LEC was not already providing broadband service in the ineligible area, one can infer from this fact that it was not economical for the LEC to provide service to that area alone, and hence prospective revenues from the ineligible area are *not* sufficient to cover stand-alone costs. This remains true even if some unsubsidized competitor, such as a cable company, already provides broadband service in the ineligible area. The fact a competitor employing a different technology may have found it economical to build out in the ineligible area does not mean that the ILEC would. Moreover, the fact that the LEC would be competing with another, preexisting broadband provider limits the amount of revenue the LEC can expect to earn, making it especially unlikely to earn enough to cover stand-alone costs of service to that area.

Even in cases where the LEC has already built out broadband throughout the ineligible area, this does not necessarily mean that the LEC was breaking even (much less recovering its stand-alone costs) over that infrastructure. Instead, as we have explained, the LEC may have been able to provide that service only because of the heavy explicit and implicit subsidies from the legacy USF and ICC systems.[75]

In short, there is no reason to expect that a carrier whose infrastructure would cover both eligible and ineligible areas will be able to generate enough revenue from the ineligible areas to cover the full stand-alone cost of providing broadband to those areas. If that assumption proves false, supplying the carrier only enough support to cover the incremental cost of service to the ineligible areas will not be enough to make it economical to build out broadband in the study area. Accordingly, the support required for carriers to accept CAF Phase II funds must be greater than the mere incremental costs that the subtractive approach would offer.

c. The subtractive approach is unworkable

In addition, the subtractive approach would be impractical to model—and even if the computational burdens could be overcome, the Commission likely would be unable to implement the model in time to implement CAF Phase II by the January 1, 2013 deadline.

As the Public Notice discusses, because the incremental cost of service to any given census block may depend on which other blocks are served, the Commission would need to calculate the stand-alone cost for an enormous number of different combinations of census blocks that are ineligible for support and then derive the incremental cost of an enormous number of eligible census blocks.[76] Moreover, because the model will also be used to determine the cut-off between "high-cost" blocks (which are eligible for CAF Phase II funds) and "extremely high-cost" blocks (which are ineligible and are relegated to the Remote Areas Fund), the list of eligible and ineligible blocks is likely to change each time the model is run, which in

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[75] *See* pp. 17-19, *supra*.

[76] *See* Public Notice at 19-20, paras. 54-55.

turn will alter the incremental costs for many census blocks and require the calculations to be re-run. Under this approach, the number of required runs of the model could be extremely high. Thus, because "the model needs to determine not just the cost of a single incremental addition to the network, but the cost of building out many areas . . . when the cost of each area can affect the cost of the others,"[77] the subtractive method would be "computationally difficult"[78]—if not downright impossible.

In addition, the subtractive approach cannot be estimated with the requisite precision or accuracy because, as the Bureau notes, there are not accurate or sufficiently granular data available on which census blocks currently receive broadband,[79] let alone which of those blocks are served by an unsubsidized competitor whose service meets the speed, latency, data-allowance, and other service-quality requirements of CAF Phase II. In fact, under a subtractive approach the problems with these data would be multiplied, because errors regarding one census block would affect not only whether that block is eligible for support, but also would affect the amount of support calculated for other, neighboring blocks; a single error in this data can create a cascading domino-effect of errors in the model's calculations. The subtractive approach is therefore a particularly unsound method of estimating a forward-looking cost model that will achieve the Commission's objectives.

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77 *Id.* at 18, para. 52.

78 *Id.* at 19, para. 54.

79 *See id.* at 25-26, paras. 81-84.

d. Common costs should be allocated according to the methodology used in the CQBAT model

The better approach is to allocate shared/common costs across the network using an appropriate formula.[80] The ABC Coalition recommends that the Bureau adopt the methodology proposed in the CQBAT model, because it attempts to allocate common costs based on cost-causation principles, consistent with past cost modeling methods used in the HCPM and UNE models. For example, since copper cable investments are driven by the exhaust of the available pairs in the sheath, copper cable and its related structure costs are apportioned to the services transported over the copper cable based on the number of pairs required to provide the service (*e.g.*, a POTS service requires a single pair of copper wires, so each POTS line is assigned one pair's equivalent of the cost; a four-wire circuit would be assigned twice as much of the copper investment as a two-wire circuit, etc.). Similarly, electronics investments are typically assigned to services based on service or DS0 equivalents since electronics exhaust when their service or DS0 equivalent capacities are reached.[81]

E. Broadband Footprint Data Collection

The ABC Coalition proposes that the Commission develop an updated data set of national broadband coverage. The Commission should begin with the national broadband map data ground date December 2011 (submitted to NTIA/FCC in April 2012), which is scheduled to be released to the public around August 2012. Because the NTIA/FCC data are generated with standards different from those used in CAF Phase II, the Commission should consider only the broadband coverage supplied by providers who meet the speed, coverage, data allowance, latency, price, and other service-quality requirements of the CAF Phase II deployment. The

[80] *Cf. id.* at 20, para. 56.

[81] See Appendix A for a more detailed explanation.

ABC Coalition proposes that the Commission initially presume that cable satisfies the minimum standards for a nonsupported competing broadband provider. Once the Commission specifies the speed, coverage, data allowance, latency, price, and other service-quality requirements of the CAF Phase II deployment, the Commission should then give the States a specified period of time to review and correct these broadband coverage maps based on their own knowledge or any newer data they may possess and to identify additional providers that meet the FCC specified requirements..

Once the Commission and the States have refined this data set, the Commission should adopt a challenge process to allow private entities to offer further updates and corrections. Under this process, price cap carriers would be allowed to challenge census blocks designated as served by an unsubsidized competitor to show that the competitor does not in fact meet the minimum service requirements, and thus that the census block should remain eligible for support. Likewise, non-price cap providers would be permitted to challenge census blocks deemed eligible for support by showing that the census block already receives sufficient broadband coverage, and thus that the ILEC should not receive federal support.

The ABC Coalition believes this process could be completed at low cost and in a timely manner, allowing the Commission to develop a substantially more accurate broadband coverage map in time for CAF Phase II implementation to proceed on schedule.

III. CONCLUSION

For the foregoing reasons, the Bureau should model forward-looking costs using a green-field fiber-to-the-node DSL architecture, with terminal value measured as investment cost minus economic depreciation as determined by the CQBAT model. The model should estimate the total costs of building to the entire study area, and it should allocate common costs according to the cost-causation formula developed in the CQBAT model. Finally, the Commission should develop an updated set of national broadband coverage based on recent national broadband data and the challenge process we have described.

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Respectfully submitted,

/s/ Donald K. Stockdale, Jr.

Donald K. Stockdale, Jr.
Scott M. Noveck
MAYER BROWN LLP
1999 K Street, N.W.
Washington, DC 20005
(202) 263-3000

Jonathan Banks
Robert H. Mayer
UNITED STATES TELECOM ASSOCIATION
607 14th Street, N.W.
Suite 400
Washington, DC 20005
(202) 326-7300

Gary L. Phillips
Cathy Carpino
AT&T SERVICES, INC.
1120 20th Street, N.W.
Washington, DC 20036
(202) 457-3046

Jeffrey S. Lanning
CENTURYLINK
1099 New York Ave, N.W.
Suite 250
Washington, DC 20001
(202) 429-3113

Michael T. Skrivan
FAIRPOINT COMMUNICATIONS
1 Davis Farm Road
Portland, ME 04103
(207) 535-4150

Mike Saperstein
FRONTIER COMMUNICATIONS
2300 N Street, N.W.
Suite 710
Washington, DC 20037
(202) 223-6807

Maggie McCready
VERIZON
1300 I Street, N.W.
Suite 400
Washington, D.C. 20005
(202) 515-2543

Jennie B. Chandra
Malena Barzilai
WINDSTREAM COMMUNICATIONS, INC.
1101 17th Street, N.W.
Suite 802
Washington, DC 20036
(202) 223-7664

Appendix A

Appendix A
Description of CQBAT's Depreciation Methodology and Treatment of Shared Facilities Costs

Economic Depreciation in CQBAT

CQBAT's Capital Cost Model calculates annual book depreciation expense based on Equal Life Group (ELG) methodologies, using Gompertz-Makeham survivor curves and projected economic lives. The use of ELG methods and Gompertz-Makeham survivor curves in estimating telecommunications plant lives is a widely recognized methodology. The survivor techniques are rooted in actuarial theory as applied to human beings, and were established by Messrs. Gompertz and Makeham in the 19th century. The application of physical mortality techniques to tangible property began in the 1920s as a result of in-depth studies conducted by the Bell System and by the staff at Iowa State University. These studies proved conclusively that actuarial theory accurately models the effects of physical (and technology) mortality on personal property. The physical mortality process uses observed mortality history to establish a mortality survivor curve that reflects past and anticipated mortality patterns. The survivor curve can be expressed using the fundamental form of the Gompertz-Makeham actuarial model, or the survivor curve may be selected from a number of standard survivor curve families. The shape of survivor curves are independent of the life in that a given survivor curve can be scaled to any physical life expectancy and still maintain its inherent mortality pattern.

ELG is a group asset depreciation approach that recognizes that equipment of a particular functional type (*e.g.*, circuit plug-in units) placed in any given year is actually made up of individual groups with equal lives. That is, for assets placed this year, there are a set of items that will last 1 year, 2 years, etc., and that the average of these life groups is the average life of the plant type. The survival curve estimates the count or percent that will fall into each life group.

Within each life group, a straight-line depreciation is used. That is, for the 1 year life assets, 100% is written off in year 1. For the 2 year life assets, 50% is written off each year. This progresses through all the life groups. When combined together, the effective depreciation rate for the account may be more akin to an accelerated life. Using ELG methodology results in a more accurate depiction of the expected lives, and resulting economic depreciation expenses, actually experienced in the real world.

The economic lives in the CQBAT Capital Cost Model all fall within the recommended range set by the FCC in CC Docket 98-137 in 1999. These lives represent a conservative view of expected economic lives today in light of the fact that technology, and competition, has progressed rapidly since 1999.

Treatment of Shared Facility Costs in CQBAT

CQBAT uses customer (working and potential) locations, existing wire center boundaries, engineering rules, and road data to size and configure a network suitable for providing broadband services at the desired speeds. Once the network is sized and configured to provide services to customers along each road segment of the network, the model determines the total installed investment, by network component and by account, for that network using Coalition provided material prices and construction costs. And, the model keeps track of investment and capacities for each network node and each cable segment, along with the services transported along each segment.

The model then assigns the investment for each node/cable segment out to the services working on that component based on a cost-causation approach. For example, if a distribution terminal is placed by the model to serve 3 working lines, then the cost of the terminal is assigned evenly to the three working lines. If the terminal is connected via a 25 pair copper distribution cable, then the investment of each segment of that cable is assigned to the number of working pairs traversing that cable section. For example, if those three lines are at the end of a route, then the last cable section is assigned to the three working lines. If the next terminal on the street adds 4 more lines, that cable section now has a total of 7 working pairs, so the investment for that cable section is spread among the 7 lines, etc.

The model's cost assignments are based on cost-causation principles. Since copper cable investments are driven by the exhaust of the available pairs in the sheath, copper cable is apportioned to the services transported over the copper cable based on the number of pairs required to provide the service (*e.g.*, a POTS service requires a single pair of copper wires, so each POTS line is assigned one pair's equivalent of the cost; a 4 wire circuit would be assigned twice as much of the copper investment as a 2 wire circuit, etc.). Electronics investments are typically assigned to services based on service or DS0 equivalents since electronics exhaust (*i.e.*, cost causation) when their service or DS0 equivalent capacities are reached. Fiber investments are assigned to services based on a combination of the number of fiber strands attached to the electronics providing the service, and potentially the DS0 equivalents required by the service when there are services of different capacities riding the same strands. For example, if a DS3 rides on a full OC48 SONET ring that requires 4 fiber strands, the DS3 would be assigned 1/48 of the investment associated with the 4 fiber strands working in a larger fiber cable.

A portion of investments associated with non-working/spare capacities are assigned to the working services in the same manner.

The model follows this process for every network node and for every segment of cable in the network, basing the assignment of network investments on the services riding the network at that point.